VOLUME 18

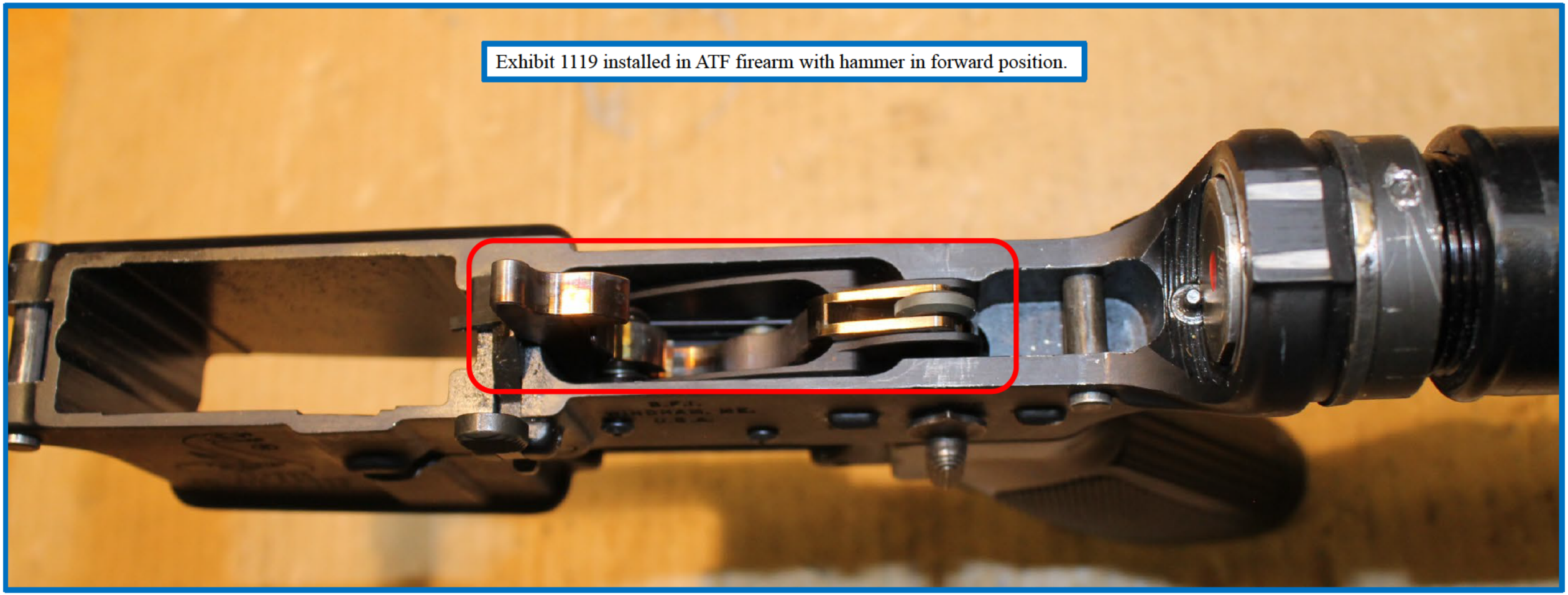


Exhibit 1119 installed in ATF firearm with hammer in forward position.

ATF 1108

Exhibit 1119 installed within ATF test firearm.

ATF 1109

Exhibit 1119 device installed within ATF exemplar firearm with trigger held in place with common plastic zip tie.

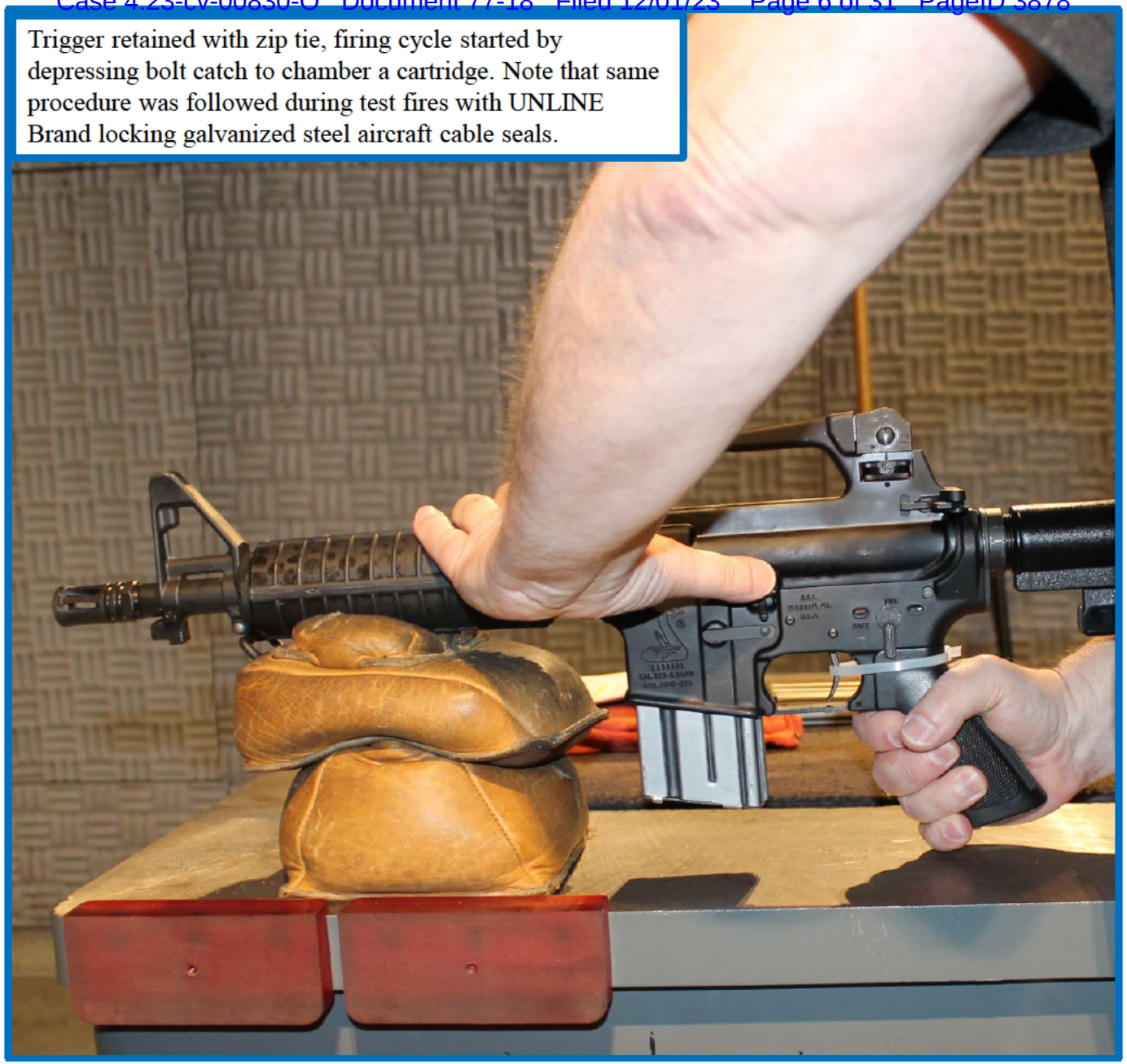
ATF 1110

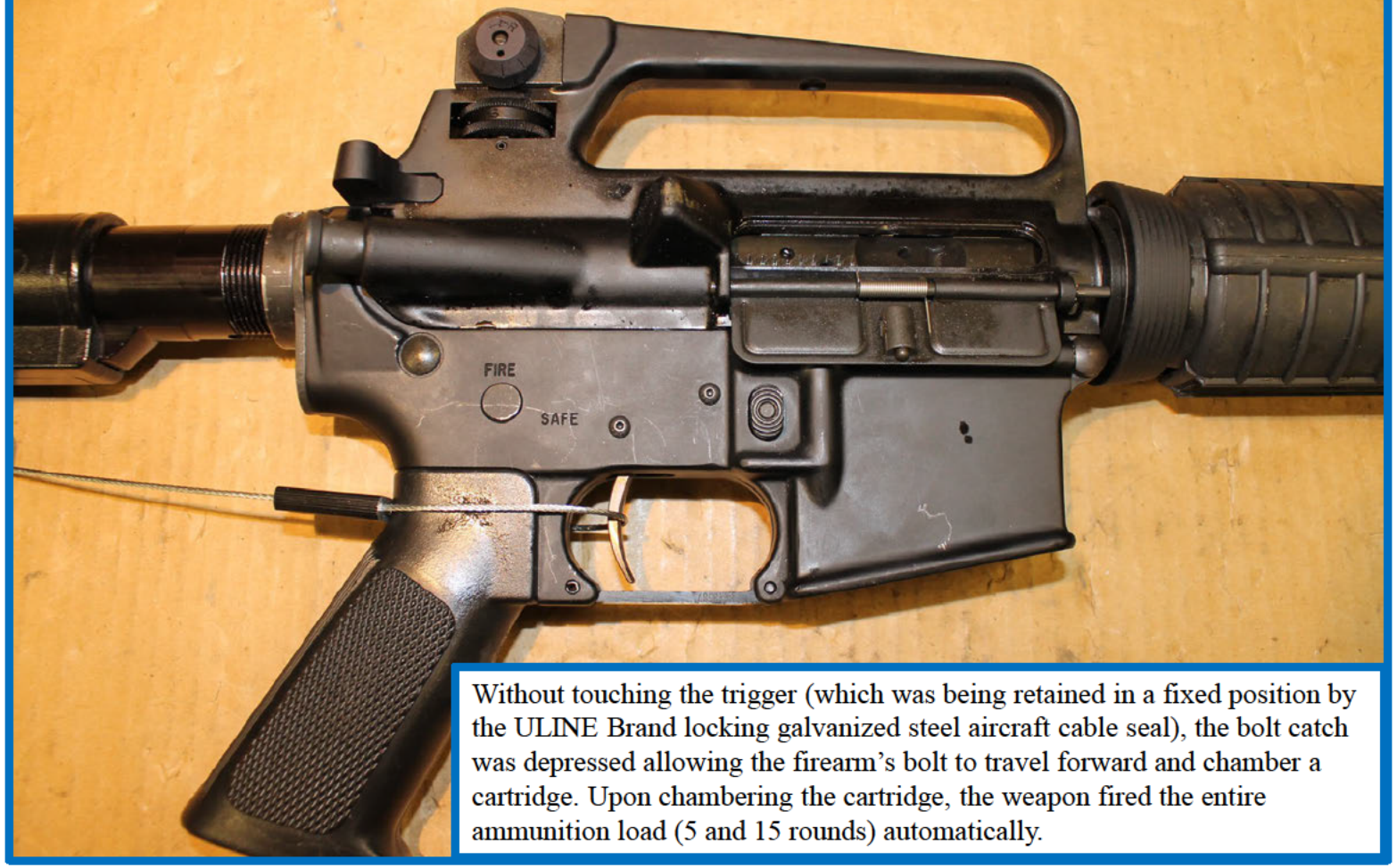
767070-21-0065

Without touching the trigger (which was being retained in a fixed position by the plastic zip-tie), the bolt catch was depressed allowing the firearm's bolt to travel forward and chamber a cartridge. Upon chambering the cartridge, the weapon fired the entire ammunition load (5 and 15 rounds) automatically. Note that same procedure was followed during test fires with UNLINE Brand locking galvanized steel aircraft cable seals.

ATF 1111

Trigger retained with zip tie, firing cycle started by depressing bolt catch to chamber a cartridge. Note that same procedure was followed during test fires with UNLINE Brand locking galvanized steel aircraft cable seals.





Without touching the trigger (which was being retained in a fixed position by the ULINE Brand locking galvanized steel aircraft cable seal), the bolt catch was depressed allowing the firearm's bolt to travel forward and chamber a cartridge. Upon chambering the cartridge, the weapon fired the entire ammunition load (5 and 15 rounds) automatically.

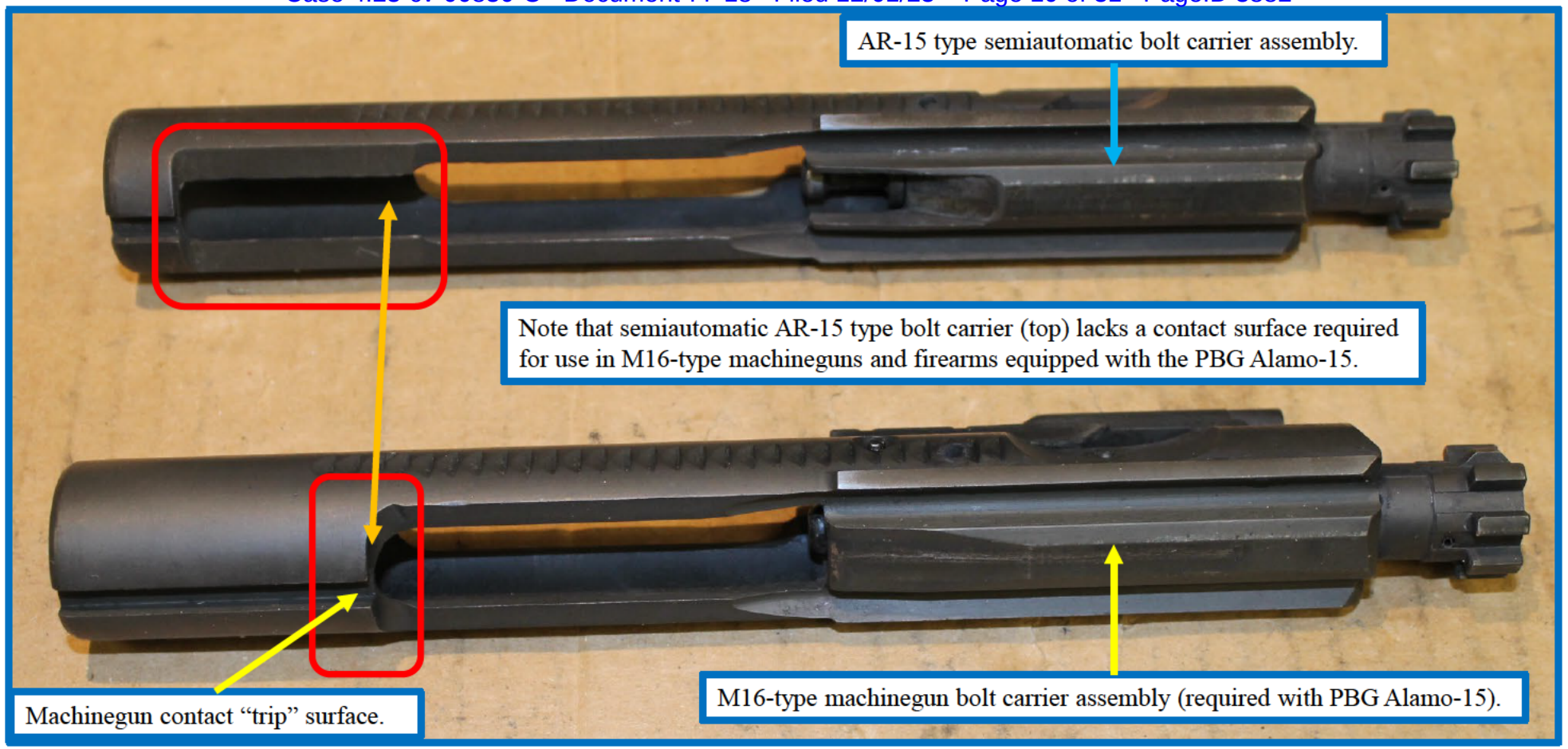
ATF NFC M16/M4 type machinegun tested for automatic cyclic rate with a measured rate of 883 rounds per minute (RPM).

ATF NFC AR-15 type receiver equipped with Exhibit 1119 PBG Alamo-15 machinegun conversion device tested for automatic cyclic rate with a measured rate of 880 rounds per minute (RPM).

ATF 1115

767070-21-0065

Comparison of semiautomatic AR-15 bolt carrier with M16-type machinegun bolt carrier (required for use with PBG Alamo-15).



The PBG Alamo-15 requires the use of an M16-type machinegun bolt carrier which incorporates a contact surface designed to "trip" the automatic sear in an M16-type machinegun to effect automatic fire, this same contact surface is required to "trip" the "safety disconnector with roller" on the PBG Alamo-15 mechanism during the operating cycle of the firearm.

THE COMPLETE AR-15/M16 SOURCEBOOK

What Every Shooter Needs to Know

REVISED AND UPDATED EDITION

Duncan Long

This system is simple and makes the rifle light. It can also create a lot of problems with dirty or slow-burning powder because unburnt particles are blown directly into the bolt area, where they may accumulate if the weapon isn't cleaned regularly.

Most military versions of the AR-15 can function in either semiauto or automatic mode. Except for a few differences between these two types of fire, the weapon functions almost identically when operated either way. AR-15s that fire only in semiautomatic lack automatic-fire sears and usually have modified disconnectors to prevent their being disengaged if the selector is in the auto position.

Commercial AR-15s are modified further to ensure that if the disconnector is removed, the hammer will be caught by the firing pin (this is why the commercial AR-15 hammer has a notch on its face and the bolt is cut away under the firing pin). Additionally the bolt carrier, rear of the trigger, and selector are generally altered so that they can't be interchanged with automatic parts, making it impossible to construct a selective-fire weapon easily by substituting or removing parts.

Once the shooter has chambered a round in an AR-15, set the selector, and pulled the trigger, the hammer strikes the firing pin, which in turn hits the primer and fires the round. As the gas behind the bullet exiting the barrel rushes back through the gas tube, it forces the bolt carrier backward, causing the bolt cam to rotate and unlock the bolt. The bolt and its carrier then travel to the rear, propelled by the last of the gas coming down the gas tube. The bolt extracts the empty brass casing and hurls out the open ejection port with the spring-loaded ejector.

The bolt carrier cocks the hammer as it travels rearward until the buffer hits the rear of its tube, at which point the rebound of the buffer and the action spring propel the bolt carrier forward. As the bolt travels forward, it strips another cartridge from the magazine and shoves it into the chamber. The final forward action of the carrier engages the cam pin, rotating the bolt and locking it in place over the cartridge.

In the automatic or burst-fire mode, if the trigger is still being held back, the inside rear of the bolt carrier hits the auto sear as the bolt locks, causing the hammer to drop and fire another round. In the burst mode, this cycling continues until only three rounds are fired; then the hammer is engaged by the disconnector and the firearm stops firing. In the auto-fire mode, the firearm continues to fire as long as the magazine has cartridges in it and the hammer is held back.

In semiauto fire, the disconnector holds the hammer back and doesn't release it until the trigger is released. At this point the disconnector drops the hammer, but before the hammer can continue forward the trigger latches onto it. When the shooter pulls the trigger again the hammer drops, firing the rifle and starting the cycle over again.

Anyone who has fired the AR-15 has probably noticed the *ka-whap* feel during recoil. This double-recoil effect is created by the buffer assembly, which has a plastic end cap and is full of loose projectiles (usually disks—or shot in cheap buffers). The disks start to recoil a few moments after the outside of the buffer does, and when they collide with the front of the buffer it creates a "hitch" in the straight rebound. The effect of this is to absorb and disperse some of the recoil as well make the "kick" of the firearm a little less abrupt. The final bump of the buffer pad on the rear of the recoil spring assembly also dampens the recoil and slows the rate of fire.

The principle reason for the complex buffer design is to slow the cycling of the rifle and, in the process, give some extra time for the cartridge to pop up in the magazine and for the various parts and springs in the trigger assembly to bounce around. Additionally, the bounce of the buffer from its plastic end cap propels it forward with extra force to make the rifle chamber rounds more reliably and make the bolt's locking more positive. (Needless to say, a quality buffer is an important feature in an AR-15 because it keeps the firearm running properly.)

For those firing an AR-15 in the auto mode, the cycling rate is too high to compensate for aiming errors. Work has been done toward reducing this rate. The technique with the greatest potential for success is to modify the buffer either by adding a hydraulic system (the Colt's choice) or more moving weights inside the buffer (thereby "pinning" it to the rear of the buffer tube for a longer time as the momentum of the weights is overcome by the recoil spring).

The latter option has been exploited by inventor Max G. Atchisson, whose system was briefly marketed in the late 1990s by Advanced Armament Corporation (AAC). Four models were made and apparently succeeded in reducing the normal auto-mode rate of fire from 600 to 800 rpm to 475 to 600 rpm. It seems likely that in the near future this buffer, or one of similar design, will resurface for enabling shooters to gain more control of the AR-15 when it's fired in auto mode.

An interesting variation on the idea of increasing the buffer weight can be seen in the Counterpoise system marketed by ArmForté. The brainchild of firearms designers Jim Sullivan and Mack W. Gwinn Jr., this system consists of a new buffer assembly, a drive spring, and a counterweight, all of which fits inside the bolt carrier of an AR-15. (The set also includes a "D-Fender" ring extractor booster, described elsewhere in this book). The Counterpoise system reduces the cyclic rate of an AR-15 to 500 to 600 rpm and also increases the forward momentum of the bolt, making chambering more reliable

even when the chamber becomes fouled with extensive shooting. About the only major modification to a firearm employing this system is a slight increase in the size of the gas port to move the greater mass of the replacement buffer and counterweight rearward during recoil. Cost of the kit is $194.

Advanced Armament also sells a buffer system that purports to reduce the cycling rate of an AR-15 by 50 percent. This kit comes with a machined-steel buffer (with tungsten weights), buffer spring, insertion/extraction tool, and instructions for use. The rifle and carbine collapsible-stock versions each sell for $149 and are available from Brownells.

Loading the AR-15

The first step in loading the rifle is to get a magazine full of ammunition. Individual rounds can be chambered by hand in an emergency, but it's a little risky unless the shooter follows the charging handle forward rather than releasing it so he doesn't get a slam-fire as described above.

Magazines can be loaded a round at a time or from stripper clips of rounds. To load one round at a time, remove the magazine from the rifle (if it's there) and hold it in one hand. With the other hand, place a round on top of the magazine follower (the part that moves down into the magazine) with the bullet end of the round toward the front of the magazine. When the cartridge is on the follower, push the round down below the lips of the magazine and then release; the round is held by the lips. Repeat until magazine is loaded.

Stripper clips can enable a shooter to load a magazine in a hurry *if* he's got the clips loaded beforehand and *if* he has a clip guide handy. Stripper clips are not a good substitute for charged magazines but can speed things up if the magazines aren't available. The clips are usually available on the surplus market; one good source for stripper clips and guides is Sierra Supply. Guides usually cost around 50 cents, clips 20 cents each.

Bandoleers are handy for carrying the clips. Even though the cardboard sleeves for the bandoleers only hold two clips, a third clip of 10 rounds can be placed to one side of the sleeve if the shooter wants to carry even more ammunition. The clip guide can then be carried in one of the pockets or—better yet—tied on to one end of a nylon cord and the other end of the cord tied to the bandoleer. Bandoleers cost around $4 each.

The clips hold 10 rounds of ammunition. Metal clips have a brass tag at each end that is bent to a right angle of the clip itself, locking the rounds in the clip. Plastic clips have a small detent dot that holds the shells in place. The clip and rounds can then be carried until they're needed.

When it's time to load an empty magazine, place a clip over the top rear end of the magazine and then a stripper clip in it so that the bullets are pointing in the proper direction. Then push the rounds down into the magazine. With practice this can be done with one smooth motion, but a series of pushes will work almost as well. (Some people find it easier to shove just 4 or 5 rounds into the magazine at a time rather than all 10.) The base of the magazine can be placed against the chest so that both hands can be used to push rounds out of the clip into the magazine.

After using several clips to put the proper number of rounds into the magazine, remove the clip guide (taking care not to loose it) and the magazine is ready.

With the magazine *out* of the rifle and the barrel pointed in a safe direction, pull the charging handle all the way back and release it. This cocks the hammer (and also makes sure the weapon is empty). Next, place the selector in the safe position if it isn't already there.

Shove the magazine into the magazine well until the magazine release clicks shut on it. Military trainers generally have soldiers slap the base of the magazine to be sure it's fully seated; in combat, this is a good idea since it is often impossible to hear the clip of the release popping into the magazine, and dirt may make a magazine seem to be in place even when it is not. Get into the habit of giving the magazine a rap so that it doesn't fall out of the rifle when it's really needed.

With the magazine in place and the barrel pointed in a safe direction, pull the charging handle all the way back again and release it. This causes the bolt to strip a round from the magazine and chamber it. Some shooters prefer to pull the bolt back slightly at this point to be sure a cartridge is in the chamber. If this is done, be sure the bolt is locked back up—perhaps by using the forward assist *if* the rifle and ammunition are clean.

The AR-15 will now fire if the selector is moved from its safe position to a semi, burst, or auto-fire position (depending on the model of the gun, some of these may not be available) and the trigger pulled. The selector positions vary among the models of the AR-15. On the semiauto-only versions, the positions are safe and fire; the auto position is not available. With the M16, M231, M16A1, early Commandos, and other variants of the M16 rifle, the selector positions are usually safe, semi, and auto. With the M16A2 series of guns, the positions are safe, semi, and burst. But among the auto-fire versions these aren't hard and fast rules; a few models may go with the auto or burst options according to the wishes of a government buyer. Furthermore, conversion kits make it possible to transform one configuration to another. And just to keep things confusing, some rifles have a four-position selector with safe, semi, auto, and burst.

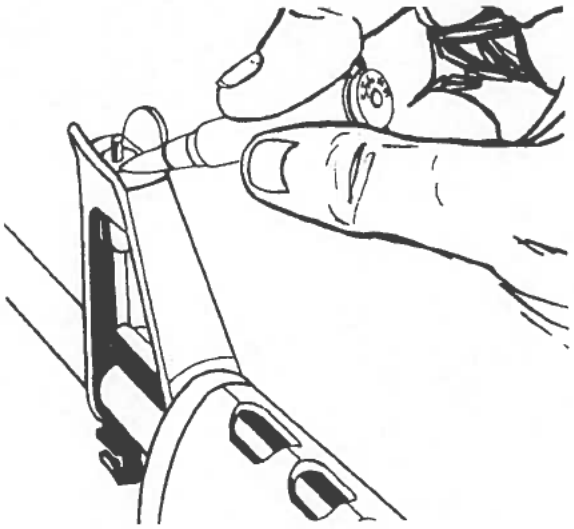
If a shooter won't be firing for a while, he should leave the selector in the safe position and close the dust cover over the ejection port. (The dust cover will pop open automatically when the rifle is fired or cycled by hand, but it must be closed manually.)

When all the rounds have been fired, the magazine follower engages the bolt catch and holds the bolt and bolt carrier to the rear. This also keeps the hammer back so that it won't fall on an empty chamber if the trigger is pulled before the shooter realizes his firearm is empty. The bolt catch allows the shooter to do a quick visual check, by turning the rifle on its side and peering through the ejection port, to ensure that the chamber and magazine are empty.

The bolt catch makes it possible to quickly bring the rifle back into action by releasing the empty magazine, placing a full magazine into the well, and pressing the bolt release. This frees the bolt so that it hurtles forward, chambering a round. The hammer is already back, so the rifle is set to fire again. If the shooter may not want to fire right away, he should again move the selector to the safe position.

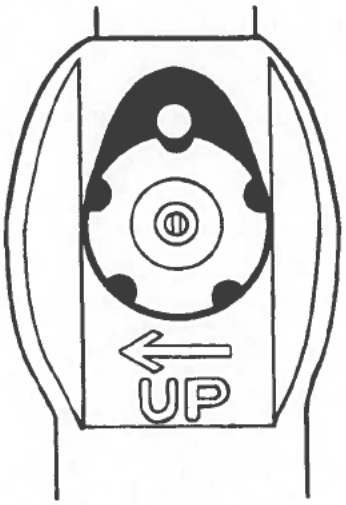
The AR-15's Sights

The sights on all AR-15s with the A1-style sights and the front sight on the M16A2 versions can be adjusted by pushing down their detents with the end of a bullet or small punch. Although this is cheap, it isn't too quick. A very useful tool for adjusting the sights is available from Quality Parts for just $8 (one tool for A1-type sights and another for A2-style front sights). The sight adjustment tool can really speed things up with the A1 sights.



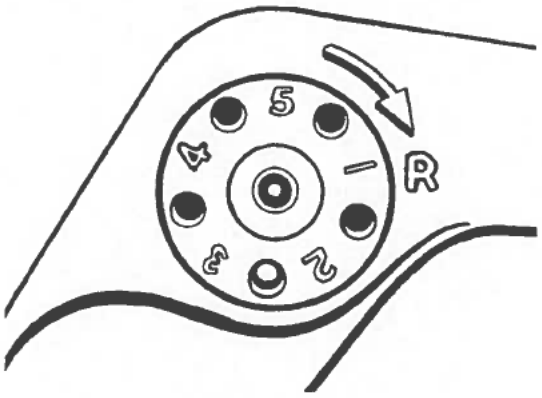
In a pinch, the front sight of an AR-15 can be adjusted with the tip of a bullet or other small tool.

To adjust windage (the horizontal placement of the bullet on target), change the rear sight. Most receivers have markings to show that clockwise movement changes the point of impact to the right. Depress the indent and move the drum as needed. With the full-length-barrel version of the AR-15, turning the A1-style sights one notch changes the point of impact by 1 inch at 100 yards or 2 inches at 200 yards, and so on. (Yes, the sights are designed for English measurements rather than metric; the change in point of impact is 2.8 centimeters at 100 meters for each detent click with the A1 windage sight.) It should be noted that with carbine versions of the AR-15 the horizontal and vertical displacement per click is



Top view of front sight.

A1 sight adjustment tool.



A1 rear sight adjustment wheel.

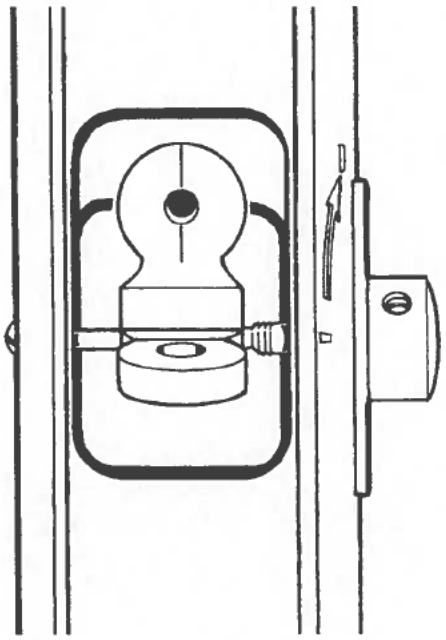
slightly greater because the sighting radius is shorter between the front and rear sights.

With the A2 sights, each click of the detent moves the point of impact right or left by 1.25 centimeters (1/2 inch) at 100 meters (A2 sights are marked in meters). For greater ranges, the amount of change can be figured by multiplying the number of meters (in hundreds of meters) by 1.25 centimeters. Thus, the shift at 200 meters is 2.5 centimeters; at 300 meters, 3.75 centimeters; at 400 meters, 5 centimeters; and so on. Once the windage knob has been zeroed, it is wise to note the setting in case it is accidentally moved or readjusted later on. Many shooters use a small dab of paint or nail polish to show where the zero should be on the rifle.

On most AR-15s the rear sight has two range apertures. One is for 0 to 300 yards (0 to 300 meters with the A2 sight), and the other, marked with an "L," is the long-range aperture for 300 to 500 yards with the A1 (300 to 800 meters with the A2). On 9mm carbines with A1 sights, the short-range setting is 50 meters, and the "L" setting is gauged for 150 meters. Remember that these figures are approximations, and flipping the long-range sight may or may not allow for accurate long-range shooting; since bullet drop can vary considerably with the actual range and the ammunition used. Nevertheless, the flip sight can be very useful.

The front sight adjusts the elevation, and this is necessary even with the A2 sight when the sights are first zeroed. Be absolutely certain the rifle's chamber is empty when adjusting the front sight, since it is close to the muzzle. There should be an arrow and markings on the front sight to show that clockwise rotation will raise the point of impact. With the A1 guns, one click changes the point of impact 1 inch at 100 yards with the standard-length barrel. With an A2 front sight, one click moves the point of impact by 3.5 cm (1 3/8 inch) at 100 meters.

Once the A2 sight is zeroed, elevation can be handled



Top view of A1 rear sight.

with the rear sight. With the aperture set to the short-range peep sight, one click raises or lowers elevation by 3.5 cm (1 3/8 inch) at 100 meters. With settings beyond 300 meters, it is quickest to flip to the "L" sight and then use the side markings to "dial up" the zero for the range. To use this sight effectively, spend some time learning to estimate ranges or, if firing from a fixed sight, step off the ranges beforehand and use landmarks to remember what each stepped-off range was (perhaps with a hand-drawn chart to keep track of the ranges).

One "trick" that can be used to sight-in a rifle that has a new barrel is to remove the upper receiver from the lower and pull out the bolt carrier. Place the receiver/barrel on a steady rest, look through the barrel from the receiver end of the gun, and center a sight on some object at 50 meters (with 9mm carbines), 100 yards (with A1 sights), or 100 meters (with A2 sights). Next, without moving the receiver/barrel, look through the sights to see where they are centered and then change them to bring them onto the "target." Continue to zero in the sights until the sights and barrel line up. Even though this visual sight adjustment won't be extremely precise, it will get you into the neighborhood when you finally start firing the rifle to zero it in.

Those who have slower twists on their AR-15 can use a .22 adapter kit for rough sighting in (and .22 CB Caps can be used for very quiet sighting in.) Usually, the zero taken at 30 yards with the .22 will be close to that of most AR-15s firing .223 Remington ammunition.

There is a lot of disagreement about where the zero for an AR-15 should be. Traditionally the 250-yard zero was used for the A1-style AR-15s, using the 0- to 300-range aperture when sighting in the rifle. With A2 sights, the rifle is generally sighted in with a 250-meter zero. According to U.S. Army training manuals, it is impossible to sight in at 25 yards (with the A1) or 25 meters (with the A2) to get very close to a 250-yard or 250-meter zero. Because of the ballistic curve of the bullet, it will be at about the same height at 25 yards (or 25 meters) as it will again be at 250 yards (or 250 meters). That's the theory.

In practice, this close zero is going to be about 7 inches off at the extended range with most rifles and ammunition. (But not only that; the M16A1 will shoot low, while the M16A2 will most likely hit high.) This is close enough for most combat in which soldiers often fail to aim and this extreme of range is seldom used, but it can be a bit aggravating to those who are perplexed about why their rifle doesn't seem to zero in as the military manuals claim it should.

The bottom line here is that if you wish to hit a target dead on at X meters or yards, your best bet is to zero the rifle in at that range, only sight in at 25 or 30 meters to get into the ballpark before zeroing at the longer range. Note that the M16A2 also generally comes closer to a 300-meter zero when zeroed at 30 meters rather than 25 as recommended in most manuals. (Rumor has it that the 25-meter range remains in vogue to help the army avoid the expense of revamping its rifle ranges to the different points).

The proper sight picture is obtained when the front post is in the center of the rear aperture vertically, with its top in the exact center horizontally. The bullet should then strike just a hair above the sight post when the shooter is firing at the distance the rifle is zeroed in.

Unloading the AR-15

To unload the AR-15 safely, the selector is set to safe, the magazine catch released, and the magazine removed. The charging handle is pulled fully to the rear so that any round in the chamber is ejected and the chamber checked to be sure it's empty (since the rifle might have failed to extract a round). The shooter may or may not want to lock the action open with the bolt stop (to do this, pressure is applied to the bottom of the bolt release button rather than its grooved top). The bolt release can be jarred off with an accidental hit on the rifle, so it should not be depended on as a safety feature. In other words, if the rifle is jarred when a full magazine is in the well and the bolt is held open by the bolt release, the bolt might go forward and chamber a round. So what appeared to be a safe rifle is now ready to fire—or might even fire itself if there is a sensitive primer on the top round in the magazine.

Remember: All firearms should be pointed in a safe direction and treated as if they are loaded at all times.

OPERATING THE M203 GRENADE LAUNCHER

For those with an M203 mounted on their rifle, the operation is pretty simple and straightforward. To load (or reload) the grenade launcher, release the barrel latch on the left side of the receiver (it is about halfway forward to the top and side of launcher's barrel). When the latch is depressed, slide the barrel forward by grasping its ringed area. This automatically cocks the striker and extracts any cartridge in the barrel, since the round or cartridge will be held by the extractor and stay behind on the receiver.

When the barrel is in its forward position, a new cartridge can be inserted into the breech. The barrel is then retracted toward the receiver until it latches. Unless the weapon is to be fired immediately, the safety should be rotated backward toward the trigger.

When the M203 needs to be fired, aim the weapon, push the safety forward (if the safety is engaged), and then pull the trigger. This releases the spring-loaded striker, which will ignite the primer and fire the round.

M203 Ammunition

The basic 40mm grenade round fired from the M203 is known as a "hi-lo" cartridge because a pistol-cartridge-sized, high-pressure section is first ignited by the weapon's firing pin, after which the gas expands into a larger space, with its pressure lowered as it expands and shoves the projectile out the barrel. These are considerably different from the grenades used with automatic weapons like the Mark 19 grenade launcher, even though the cartridges are very similar. The latter operate at a much higher pressure that would produce recoil forces unmanageable in a weapon like the M203.

A wealth of cartridges is available for the M203. The HE star flare (usually on a parachute), and smoke rounds are the most commonly issued. HE rounds have a maximum range of 400 meters with a casualty radius of 5 meters. They are armed when they achieve a certain number of fast rotations after leaving the barrel—usually at 30 meters from the barrel.

There have been a variety of cartridges created for the M79 and/or M203 over the years, and it isn't rare to see oddball pieces that have been cobbled together by unknown inventors. Likewise, some M203 owners "roll their own" by reloading cartridges or even making rounds from scratch using plastic pipe and other components.

Very short-bodied buckshot rounds (XM576E1 and XM576E2) were seen on occasion in Vietnam. These

have a range of only 50 yards for a good hit probability; each round contains 27 pellets of 00 buckshot, making it roughly equivalent to a load of 12-gauge buckshot. Adapters to allow firing shotgun shells in the M203 tube have also been made.

A slightly different approach was taken with some experimental cartridges, including units with eighteen .22 LR shells, all with a "barrel" formed in the body of the cartridge. A large striker plate fired this at the instant the firing pin of the launcher struck it. Lack of rifling made these cartridges less than ideal, and they most likely have not seen use in combat.

Much the same can be said for the flechette cartridges created in 40mm. These seem effective but in reality tend to spread in a pattern that sends some over the target, while others are lost in the ground ahead of the target.

Also seen is the tear gas cartridge, a "silent" DBCATA (Disposable Barrel and Cartridge Area Target Ammunition) round (see Chapter 5) that employs a metal sleeve to contain the discharge of the round. Ahead of the sleeve, a projectile is hurled with some force, almost silently since the report is contained in the cartridge. This makes it possible to launch a grenade without having the enemy easily locate the shooter. Whether these rounds have ever been fielded is unknown.

The XM688 cartridge has a grappling hook on a line. In theory, this should allow the M203 to launch a line that soldiers could use to climb up onto a building. It is doubtful that this is practical or has ever actually been used.

The GR103 cartridge fires a fine coil of wire up into trees, where it can be employed as a long-range antenna. Again, this cartridge has probably seen little actual use, and with new radio technology would seem destined to become obsolete.

Other experimental cartridges produced for the M203 have included miniature mines that can be laid ahead of a position where they wait to be trampled on before going off, rocket-assisted projectiles to create added range, and cartridges with exposed flechettes on which "biological material" could be placed for delivery against a target. The latter projectile doesn't have much of a future in the military: such a round is against the conventions of war, for starters, and is not one a soldier would care to handle, much less have in his possession if captured.

Aiming Systems for the M203

There are two aiming systems for the M203. One is a sight mounted on the top of the handguard just behind the rifle's front sight; the other is a quadrant sight assembly that mounts on the AR-15's carrying handle. The handguard sight is used in conjunction with the front rifle sight after the ladder sight assembly is erected so that it is at right angles to the barrel. The shooter sights down the aperture using the sight alignment markings calibrated in hundreds of meters (1 being 100 meters, 2 being 200 meters, and so on.). When the target is lined up with the correct range, the weapon is fired.

The quadrant sight is fragile and slower to use but is also more accurate if the shooter can judge ranges well. First, the range is estimated, then it is dialed up on the elevation scale that is marked in 25-meter increments. When the range has been set, sighting is done through the rear aperture of the quadrant sight to the front sight post at the front of the quadrant sight. The front post sight is lined up on the target, and the launcher is fired. Great care has to be exercised not to damage the front sight/elevation screw when carrying an M203 with a quadrant sight.

SAFETY CONSIDERATIONS

There are a number of safety precautions particular to the AR-15. Even though such problems are not normally encountered in "real life," the unexpected is always possible—and it only takes one anomaly to cause a tragedy with a rifle.

Though many precautions apply to all types of rifles, the AR-15's floating firing pin can cause extra complications. Because the firing pin normally rests against the cartridge when a round is chambered, striking the muzzle or dropping the firearm from a great height onto its muzzle might create enough inertia to fire the cartridge. This is not normally a concern except perhaps for those shinning down ropes on the sides of buildings or from helicopters, but does bear remembering.

What's more important is to avoid firing with an obstruction in the barrel. Before firing a rifle that has been outside for some time or that may have an obstruction in the barrel (e.g., mud, snow, rain, leaves), always check to be sure the barrel is cleared. This is done by removing the magazine and cycling the rifle so that the chamber is cleared. The chamber must be inspected to ensure that it is clear. The bolt carrier is then locked to the rear by pushing on the lower section of the bolt release while the carrier is all the way back. When it is certain that the rifle is empty, the barrel should be examined from the muzzle end. If the barrel is obstructed, it must be cleaned out with a bore brush. Firing the rifle with an obstruction in it will create a bulge in the barrel or blow it up on the spot.

A muzzle cap is useful in keeping "junk" out of the barrel and is readily available from Choate Machine and Tool as well as on the surplus market. If it becomes necessary to fire the rifle in a hurry, it can be fired with the cap in place (provided everything else is as it should be).

The .223 bore is so narrow that it's possible for it to hold a column of water. So if a rifle is dropped into water or has been in heavy rain, it's always wise to remove the muzzle cap, point the muzzle down, pull the charging handle back 2 or 3 inches, and allow a few seconds for the water to drain out of the bore.

The trigger finger should be kept out of the trigger guard until it's time to fire. If the finger is left inside the guard and the shooter falls down or gets excited, it's very easy to fire the rifle accidentally.

When firing the rifle, it's important know what is behind and beyond the target. Even though the AR-15's useful range is only out to between 500 and 800 yards, its bullets can travel up to 3 miles and penetrate a lot of material. Additionally, ricochets from a rock or water can alter the original, intended path of the bullet. *Shooters must think before firing.*

It's wise to always switch the selector from the fire position back to safe if the rifle won't be shot for a while. The shooter should get into the habit of thumbing the safety as the rifle is brought up (so that it isn't discovered that the selector is in the fire position when it isn't supposed to be). The rifle is much less apt to be accidentally fired if the selector is left on safe.

Only the best of ammunition—if possible, factory—should be used. For reloading, full-case resizing is a must, and primers must be fully seated, bullets tightly crimped, and the case free from oil. Corroded, dented, or hot (135+ degrees Fahrenheit) ammunition should never be used.

If a shooter fires a gun extensively and then stops firing, it's wise to eject the round in the chamber within 10 seconds and lock the bolt open with the chamber empty. This will prevent a "cook-off," which can occur when the heat of the chamber causes the powder in a cartridge to ignite.

If it's impossible to eject the round in a hot chamber, a cook-off can occur up to 15 minutes later. The rifle must be kept pointed in a safe direction during this time. If it is necessary to eject a "hot" round, it should not be approached once it is out of the rifle. Even though the bullet isn't dangerous if the round goes off outside the rifle, the small fragments of brass hurled in all directions when the cartridge explodes can cause cuts or eye injury at close ranges.

If you hear a softer than normal discharge or "pop" is heard or reduced recoil is experienced when a round is fired, that may mean that a bad round has been fired and has left a bullet, bullet jacket, or other obstruction in the barrel. If this happens, firing should be stopped immediately, the magazine removed, the charging handle pulled back, and the action locked open. Then the chamber should be visually inspected to be sure it's cleared. Next, the selector should be placed in the safe position and the bore visually inspected and/or a cleaning rod run down it. If a jacketed bullet is wedged in the barrel, it is next to impossible to remove it; this is a job best left to an armorer or gunsmith. If the rifle is necessary in combat and a bullet is stuck in the barrel, it is *possible* to remove it by taking another cartridge *without its bullet but with its powder* and putting it into the chamber and firing it. This is a risky, however, and is recommended *only* as a last resort. This can damage the rifle.

If a cartridge is jammed in the chamber so that it cannot be fired but cannot be extracted, and if the shooter is in combat, then he's in a jam along with his rifle. There are ways to remove the round, but none is safe. One is to put a cleaning rod down the barrel and push downward while pulling back on the charging handle. (This is dangerous because the bore is obstructed by the rod, and *if* the round is accidentally discharged . . .)

Another method is to remove the magazine and reach through the magazine well with a screwdriver and pry the carrier back from the barrel. This may work, or may only break the extractor and/or scar up the receiver and bolt carrier. It's critical to remember that you're working with a live round, which could be set off. Weigh the costs before trying any of this, and be extremely cautious.

Cold Weather

Firing the AR-15 under extremely cold conditions may dictate the shooter's wearing mittens or large, heavy gloves. In such a case the AR-15 trigger guard can be released to make room. To release it, a cartridge or other small tool is pushed against the spring-loaded pin at the front of the guard/lower receiver hole. When the pin is depressed, the trigger guard is rotated down to where it can be held against the front of the pistol grip (the shooter may wish to tape or wire it in place). It should be remembered that once this is done a safety device has been defeated—any twig, branch, or other obstacle that gets into the trigger area might fire the rifle. To minimize this risk, the safety has to be engaged until it is time to fire the rifle.

Most accidents with the AR-15 can be prevented or minimized by using proper ammunition, keeping the rifle clean, and, most important, always treating the rifle as if it is loaded and might be fired accidentally at any moment. *It must never be pointed at anything that isn't meant to be shot.*

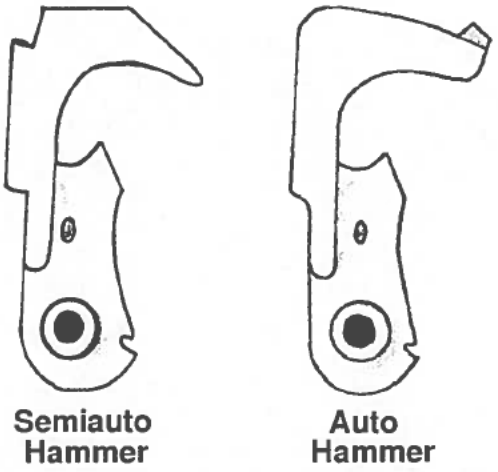
Whether shooting a military rifle with an M203 launcher mounted on it or a semiauto AR-15 Sporter, common sense and good shooting habits can keep the shooter and those around him safe.

with acetone (nail polish remover), but it's better to avoid using it than to join parts that might need to be taken apart later.

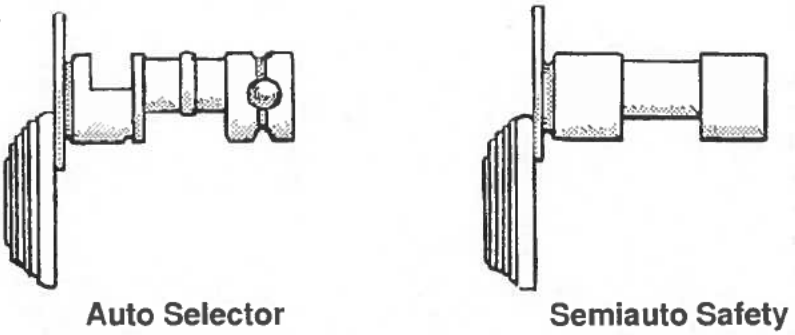
M16 Parts

Occasionally, a semiauto AR-15 parts kit will come with a military-style hammer (with a hook on its rear spur), which may be coupled with a selective-fire disconnector (with a tail that extends back to the safety) and/or an M16 auto selector rather than a standard safety. Any of these can be dangerous because they may allow a slam-fire to occur, and if BATF is out hunting scalps, the gun may be viewed as an illegal selective-fire weapon. So take care to avoid these parts.

If an M16-style part somehow is received in a semiauto kit, modifying it isn't very complicated, but it does take time, and great care must be taken not to damage it. The modification entails cutting through the hardened surface of the part, making it considerably less durable, so it's generally better have the parts altered by a gunsmith. Or, cheaper yet, simply purchase new parts and then trade the old ones at a gun show. But those who wish to can alter the parts with a grinder wheel, blowtorch, and some other tools found in most shops. The easiest work consists of grinding off the disconnector tail, and in theory this is all that's needed to avoid having a selective-fire rifle. Grind slowly and dip the part in water from time to time to avoid overheating it and ruining the metal's temper.



Caption: The difference between the semiauto (left) and automatic (right) versions of the AR-15 hammer are easy to see.



The semiauto (right) and automatic selector.

The next alteration is to grind the rear hook from the hammer's head and add a small—and important—cut into its face. The angle of the new cut isn't extremely critical, but take care to get it as close to the semiauto style as possible so that it functions properly. Having an AR-15 semiauto hammer to copy is a big help for getting this right. Again, be careful not to overheat the part while grinding it.

The safety/selector should have the small ridge in the center of its crossbar ground down or filed away. The rest of it must not be altered, or the safety may fail to function.

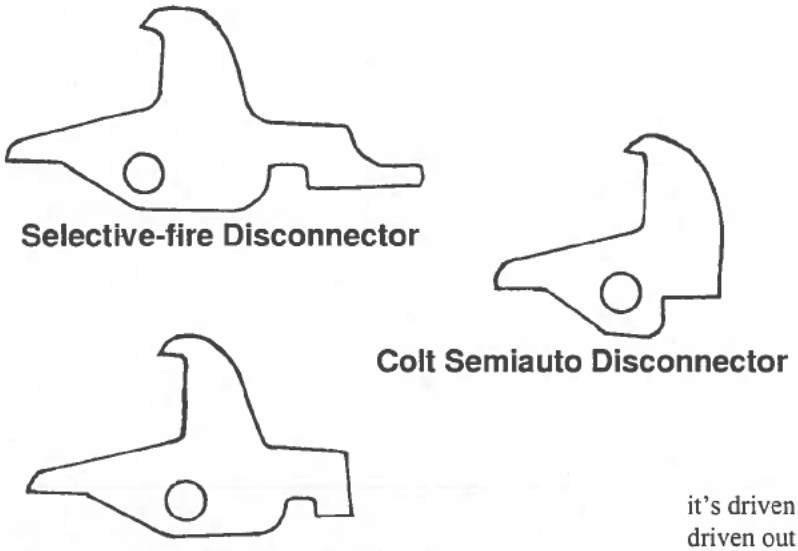
Next, a small piece of metal should be soldered over the open rear end of the trigger so that it won't accept an extended M16 disconnector. When this is done, take care once again not to overheat the front of the part; wrapping the nose of the trigger in a wet cloth while the rear is soldered is probably the safest way to do this.

The automatic disconnector is easily modified by simply grinding off its "tail" so that it fits in the semiauto trigger.

The bolt carrier has the rear of the firing pin exposed so that it will catch on the cut in the hammer face, locking the bolt open if the disconnector fails. The bolt carrier is constructed of unhardened steel; removing the metal to expose the rear of the firing pin is easily accomplished with a file.

After these alterations are made test the AR-15 for proper functioning. First remove the magazine (checking the chamber to be sure it's empty), place the safety into its FIRE position, retract the charging handle, ease the charging handle about halfway forward, and hold it there. Then depress the trigger. Release the charging handle and, if the work has been done properly, the carrier will lock partway open. To free the carrier, release the trigger and pull back on the charging handle. The bolt carrier should now go fully forward, and the hammer should remain cocked.

After testing, the parts that have been altered should be hardened or tempered. This is a job for a gunsmith



The automatic version of the disconnector can be recognized by its "tail," which is missing from both Colt's as well as non-Colt's semiauto versions of this part.

with a lot of experience—in part because he knows what color indicates a specific hardness of steel parts when they are heated. Most amateurs are just not set up to do this sort of work, so it is best to avoid it if possible.

ASSEMBLY

The following procedure list will help beginners assemble an AR-15. It's a good idea to check off each completed step to avoid missing an essential procedure. And it's best to follow the steps in order if the rifle is to go together properly. The diagrams can help in orienting parts correctly; even better is to borrow a friend's AR-15 to use as a model.

Lower Receiver

- Clean out the holes of the lower receiver with small, hand-held drill bits.
- Mount the trigger spring (diagram 1, #10) around the trigger posts (diagram 1, #9). Notice that the spring has its crosspiece to the front and under the front bar of the trigger. Each loop goes around the outside hub on either side of the trigger.
- Set the disconnector spring (diagram 1, #10) in its well in the trigger. The small end of the spring points down toward the trigger.
- Next, put the disconnector (diagram 1, #8) on its spring in the slot of the trigger. To speed up the assembly, temporarily slip the selector lever detent (diagram 1, #23) into the pin hole to hold the disconnector and trigger together. The thickest part of the detent should be inside the center of the disconnector's hole.
- Lower the disconnector and trigger into the lower receiver so that the trigger spur goes through its slot in the base of the receiver.
- Get the pivot hole of the trigger lined up with the hole in the side of the receiver, then drive the trigger pin (diagram 1, #2— it's identical to the hammer pin) in from the side. Gently tap the pin (so the detent doesn't get damaged) until it's driven almost all the way in. The detent will be driven out by the pin (be sure not to let the detent get away). Just before you drive the pin on through the receiver, align the trigger hole with those in the receiver and then tap the pin on through.
- Position the hammer spring (diagram 1, #4) on the hammer (diagram 1, #3). The two legs of the spring should point toward the base of the hammer, and the crosspiece goes behind the neck of the hammer. Check the diagram for proper orientation.
- Shove the hammer into place. The legs of its spring go over each hub of the trigger and the loop of the spring behind the back neck of the hammer. Hold the hammer down and insert a nail or punch through the receiver hole. While the nail holds the hammer and its spring, drive the pin into its hole from the opposite side of the receiver, pushing the nail out and securing the hammer.
- Check the pins holding the hammer and trigger in place by gently pushing them. They should not move out (if they do, they will "walk" out during shooting).

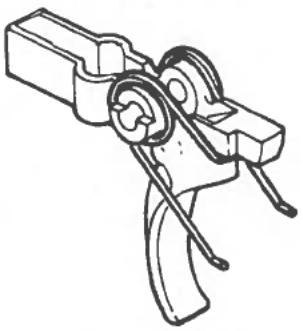
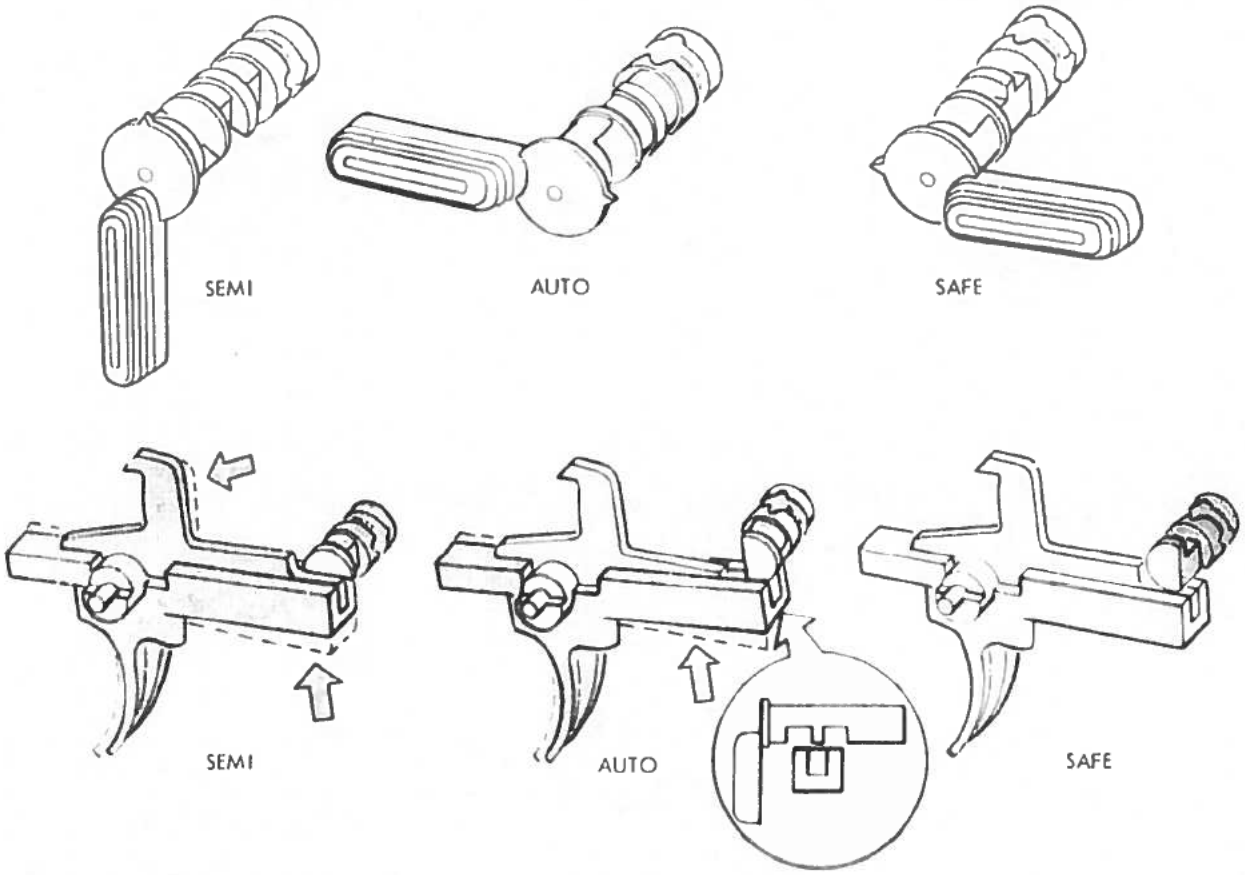


Diagram 5, proper orientation of the trigger spring before the trigger is inserted into the receiver.



M16/M16A1 automatic-fire trigger group in operation.

operation (just as the standard disconnector is during burst or auto fire). This leaves only the auto sear in operation so that the hammer continues to fall as long as the trigger is back and the bolt forward.

The burst cam (diagram 6, #3) currently in production is for a three-round burst. After the third shot is fired in this burst, the forward hook on the disconnector/counter (diagram 6, #9) is dropped forward by a cam that is lower than the previous two on the rotating cam. This allows the hook on the disconnector/counter to move forward under its spring pressure to clip onto the hook on the side of the trigger, ending the burst and holding the hammer until the trigger is released. The AR-15 can also accommodate double-, four-, or five-round burst cams; these have been made on an experimental basis and might easily be fabricated by a gunsmith.

Assembly of the burst-fire parts is basically the same as with the semiauto version of the rifle, with a few additions. As with other trigger groups, care should be taken not to mix semiauto-only, automatic, or burst-fire parts up; they are not interchangeable.

- Burst-fire trigger groups have a small burst cam (diagram 6, #3) and spring (diagram 6, #4) that go over the right side of the hammer. The hammer spring (diagram 6, #2) then goes over the hammer legs with the crossbar of the spring behind the head of the hammer.
- The trigger (diagram 5) should have its spring placed on its struts with the crosspiece of the spring below the nose of the trigger.
- The two sear springs (diagram 6, #10) are nestled in the single well in the top of the trigger; the sear/counter (diagram 6, #9) goes on the right side of the trigger, and the sear (diagram 6, #8) goes on the left. A slave pin or small length of wire no wider than the trigger should be placed in the trigger's shaft to secure the sear/counter and sear.
- Place the trigger assembly in the receiver and drive its cross pin through (driving out the slave pin) to hold it in place.
- Lower the hammer assembly into the receiver with the two spring legs over the struts of the trigger. Once the hammer assembly is in place, drive the

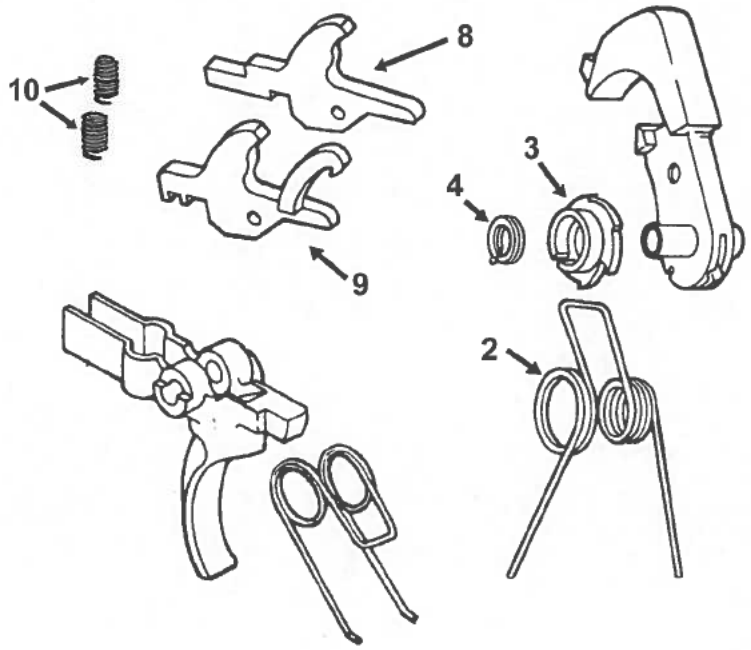


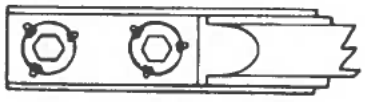
Diagram 6, burst-fire trigger assembly.

cross pin through to secure it. Then cock the hammer and insert the selector.

- The auto sear spring is normally already mounted on the auto sear. If not, place it there, using the hollow pin to hold it in place. Then position the assembly (diagram 1, #6) and secure it with its pin (diagram 1, #5). This will complete the automatic version of the AR-15.

Bolt Carrier

If the bolt carrier (diagram 3, #13D or 13E) does not have the key (diagram 3, #13C) mounted on it, position it on the bolt and screw in the two hex bolts (diagram 3, #13B). Use a punch to stake the bolt carrier metal over the edge of each hex bolt; it's essential that the bolts not come loose. If they do, the pressure of the key will shear them off very quickly.



Top view of carrier key showing metal "staked" over the heads of the hex bolts.

- If the bolt (diagram 3, #4) is not assembled, slip the three bolt rings (diagram 3, #11) onto it. Do not line up the rings' spaces; that would allow gas to seep through the spaces and hinder the action of the rifle.
- Set the extractor spring (diagram 3, #7) in its well. Many kits have a small silicon insert that goes inside the spring to aid in its functioning.
- Put the extractor (diagram 3, #6) in its proper location and slide its pin (diagram 3, #5) into its hole.
- Notice that the ejector (diagram 3, #9) has a slot in it. The longer end above the slot goes toward the face of the bolt, and the slot lines up so that the roll pin (diagram 3, #8) can go through the slot. Put the ejector spring (diagram 3, #9) into its well and follow with the ejector, aligning it properly. (An empty cartridge can be used to hold the ejector down.) Push a drift punch into the roll-pin hole to retain the ejector. Now drive the roll pin into the bolt from the side opposite the punch.
- Be sure the extractor is aligned so that it's on the same side as the bolt carrier's two oil holes (and bolt-assist grooves), and push the bolt into the bolt carrier. (If you don't align the bolt properly, it's impossible to push the cam into place in the next step.)
- Push the bolt cam (diagram 3, #3) into the bolt and bolt carrier. Then turn the cam so that it's under the bolt key.
- Slide the firing pin (diagram 3, #2) into the bolt by inserting it into the rear of the bolt carrier and bolt.
- The firing pin retaining pin is now slipped into the bolt carrier from the side opposite the bolt's extractor. Do not spread the feet of this cotter pin. If the bolt carrier is turned with the bolt face up, the firing pin should not fall out. If it does, remove the retaining pin and reinsert the firing pin.

Forward Assist and Ejection Port Cover

Not all upper receivers have a forward assist. Therefore you may need to skip the next few steps if your rifle doesn't have this feature.

- The forward-assist assembly (diagram 2, #32–38) is generally together when purchased. If not, note the alignment of parts on the diagram and assemble

The Ultimate rapid fire mechanism.

For most of those who need precision and a nice light pull, a better solution is to purchase a match trigger group and place that in the gun. A number of companies offer these. One good bet is Bushmaster's parts set, which was created for its target rifles. Costing $119, this set has a modified selector and hammer spring that can be set for a pull of 3.5 pounds at the first stage and a light 1 pound at the second, letoff, stage. (The only catch with the Bushmaster target trigger set is that it won't work in Colt lowers with the politically correct "block" over the safety—something to keep in mind if you own one of these rifles.)

Brownells offers a stainless-steel match trigger set of parts that fit the AR-15 Match Target Competition H-BAR and AR-15 Match Target Competition H-BAR II, as well as other Colt rifles. This set costs $86.25. Brownells also offers a J P Enterprises Low Mass Hammer, which is 36-percent lighter than the standard hammer: in theory this gives a faster ignition of a primer; easier to notice is the crisper trigger pull. The cost is $44.95.

TRIGGER ACTUATOR

Inventive activities are often spawned by government restrictions, and this most certainly has been true with the current ban on manufacturing automatic weapons for private citizens and the tight restrictions on ownership of such firearms in many states. This has led to hand-cranked trigger pushers, trigger group inserts, and other devices that make rapid fire possible without technically converting an AR-15 to what is legally a selective-fire configuration.

The B.M.F. Activator was one of the first of these devices and is still available used if a person shops around on the Internet. While arguably an adult toy rather than a serious combat device or the like, its Gatling gun-like action can be a lot of fun when plinking with a rifle. The unit clamps to the trigger guard of the AR-15; cranking its handle causes a cam to cycle in and out, toggling the trigger and causing the rifle to fire each time the cam comes out, four times for each rotation of the handle, with the action happening according to the speed with which the crank is turned. The big shortcoming of the B.M.F. Activator is that its plastic body warps if it's left on the rifle for any length of time. But it does create bursts of fire. (One has to wonder why no one has created a metal version of this device; it might become a "serious" tool if it were a tad more robust and reliable.)

A similar mechanism is the Ultimate, which consists of a pistol grip that replaced the standard grip. Once in place, a long lever on the unit is cycled by the shooter's fingers, causing the trigger to be tripped by a small cam in the mechanism both when pulled and pushed, firing two shots during the time one normally takes place. By cycling the lever quickly, short bursts can be fired. The Ultimate originally sold for $130 but is now out of production.

The Tri-Burst was another device like the two above that employed a ring outside the trigger guard to activate

a lever with three cams that tapped the trigger each time the external ring was pulled. This created a three-round burst of sorts, though it was a bit awkward due to the long arch of the ring. Perhaps more troubling was an external trigger that might cause the rifle to fire if it was dropped. Perhaps it's fortunate this device is no longer marketed.

Of course, a motor or wind-up clockwork spring system might be attached to a BTF or other system to create automatic fire with a press of a button. And that's just what it would be considered legally as well: automatic. And illegal. Therefore, no one should be tempted to create such a device: it would undoubtedly be awkward, heavy, and illegal.

Much the same effect, also generally illegal, can be created by shortening the reach of the disconnector in the trigger group of an AR-15. The hammer will then drop from the disconnector hook when the trigger is released but will not be caught by the nose of the trigger, thereby causing a second shot to be fired. (Since an automatic weapon must legally fire more than one shot with each *pull* of the trigger, this is technically still a semiauto rifle, though I would not recommend attempting to claim innocence by arguing this fine point in court.)

It might even be possible to add a lever to a disconnector and connect it to a cam on the selector to create a "two-round burst" position in the rear position of the selector.

But . . .

There's a big catch. It creates a potentially very dangerous situation for anyone picking up the rifle and trying it out—who probably won't expect a second shot when the trigger is released. Also, if a shooter "freezes" and hangs onto the trigger when he fires, he is left with a gun that will go off the moment he releases the trigger—again very possibly with disastrous results. All in all, it's better to avoid creating a dangerous situation like this, legalities aside. (For those who might be otherwise tempted to create such a modification, it is my understanding that this too has been ruled illegal by the BATF.) Another gadget that creates the illusion of automatic fire is the Hell-Fire, a device that fits onto the AR-15's trigger guard. The device uses a spring mechanism that reduces the pull on the trigger so that the trigger can be pulled very easily with the lever on the Hell-Fire system. Once the shooter becomes familiar with the device, the trigger finger can be held more or less stationary with the hand alongside the gun. This allows the recoil to push the shooter backward, and his stance and the internal recoil spring, bolt, and carrier then propel the firearm forward slightly after recoil. As the gun goes forward, the trigger finger lightly touches the trigger, tripping it, and again firing the gun. This continues, creating the effect of automatic fire even though the AR-15 is actually firing in a semiauto fashion. The end result is what looks and sounds like automatic fire—but under conditions that make it nearly impossible to aim the gun with any reliability.

For those into lots of bangs at a time, the Hell-Fire system is fun to shoot. It can also be dangerous if the user is unfamiliar with it, so it's wise to practice with only a few cartridges in a magazine until controlling the recoil is learned. And, for safety reasons, when the Hell-Fire is attached to the trigger guard, the chamber of the rifle is best left empty until just before firing.

A few small nations are said to have purchased these units for use with their armies. And the Branch Davidians apparently invested in some of these devices. Perhaps this tells you something. It is best to use these devices only for entertainment, and only when you're being very careful to avoid accidents.

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As mentioned at the beginning of this chapter, new accessories and modifications for the AR-15 are continually coming out. Just don't get caught up in trying to get the perfect rifle and accessories . . . you never will. Always look at things as a compromise. Once an owner finds a setup that works for his needs, he should stick with it and practice with his gear.

A person who's familiar with his equipment and operates it well can almost always outperform the guy with the "state-of-the-art" equipment who's bogged down by too much and hampered by his ignorance.

Shooters should purchase only the essentials and then practice and practice some more until their shooting skills are honed to perfection.

Chapter 14

Selective-Fire Conversions

Selective-fire weapons have always been controversial. One side of the argument is that if bursts of ammunition are needed, either the cartridge being fired is too mild or the shooter needs better shooting skills (with one gun guru calling the submachine gun a "slob's weapon"). The other side is that in combat there is little time for aiming and bursts are needed to compensate for the loss of abilities under the stress of combat—in which everyone becomes a slob trying to survive.

Probably the truth lies somewhere in between.

Often the less a person knows about combat, the more effective he thinks automatic fire will be. Film As film footage of soldiers in Vietnam and Lebanon who fired long bursts over barricades without even seeing a target shows, that automatic fire can turn a rifle into something akin to a one-shot, sightless weapon, as soldiers hope they can hose an area and accidentally hit an enemy in the process. Such sites certainly bolster the slob theory of automatic weapons use.

But sometimes automatic fire is effective, and on the battlefield there is little doubt that automatic weapons totally changed the face and tactics of combat when they appeared at the end of the 1800s. Abruptly, the number of men a commander had behind bolt-action guns with long bayonets didn't matter as much as how many machine guns the enemy had.

In addition, the AR-15 is more controllable during automatic fire than older, larger-caliber rifles. In the hands of an experienced shooter, an AR-15 with good muzzle brake is every bit as controllable as a submachine gun and has a range that rivals that of the heavier machine guns. And three-round burst modification, coupled with lightweight ammunition (in contrast to cartridges like the .30-06), does a lot to extend the amount of ammunition the shooter of a selective-fire AR-15 has on hand.

To the detriment of civilians, many U.S. politicians and their staffs apparently do their legislation research in front of the silver screen. But this is nothing new. When movie gangsters started being portrayed with "Tommy guns," the politicians became convinced that only gangsters bought automatic weapons and the 1930s saw restrictions placed on such guns, with some states all but banning automatic weapons.

Much the same thing happened in the 1980s as shows like "Miami Vice" showed drug dealers using all kinds of high-tech guns rather than the revolver most criminals still carry. Soon the hue and cry against certain types of guns was heard in Washington, D.C. Despite the fact that only one registered machine gun had ever been used to commit murder since the restrictive laws of the 1930s, and then only by a jealous spouse rather than a hardened criminal, a move was soon afoot to fight crime by banning the manufacture of automatic firearms (for everyone but government users, of course). By 1990, the manufacture of new selective-fire guns for citizen purchase had been banned in the United States.

PURCHASE AND REGISTRATION

For those who were still living in states where automatic weapons could be purchased and owned (albeit after fingerprinting, red tape, and transfer taxes), some manufacturers went all out to produce selective-fire weapons before the manufacturing ban. Furthermore, many automatic AR-15s were already in private ownership. Consequently, those who want such guns for recreational shooting, self-defense, or whatever can still purchase them in many states—although the prices are climbing as more and more people decide to purchase the guns but fewer and fewer guns are there to be sold due to the ban.

Once a gun is registered as a machine gun, its basic configuration can be changed: this includes the various parts in it because only the lower receiver of an AR-15 has a serial number. Therefore, it is likely that many of today's AR-15s could have long lives as selective-fire rifles. Such firearms can be "upgraded" by adding burst-

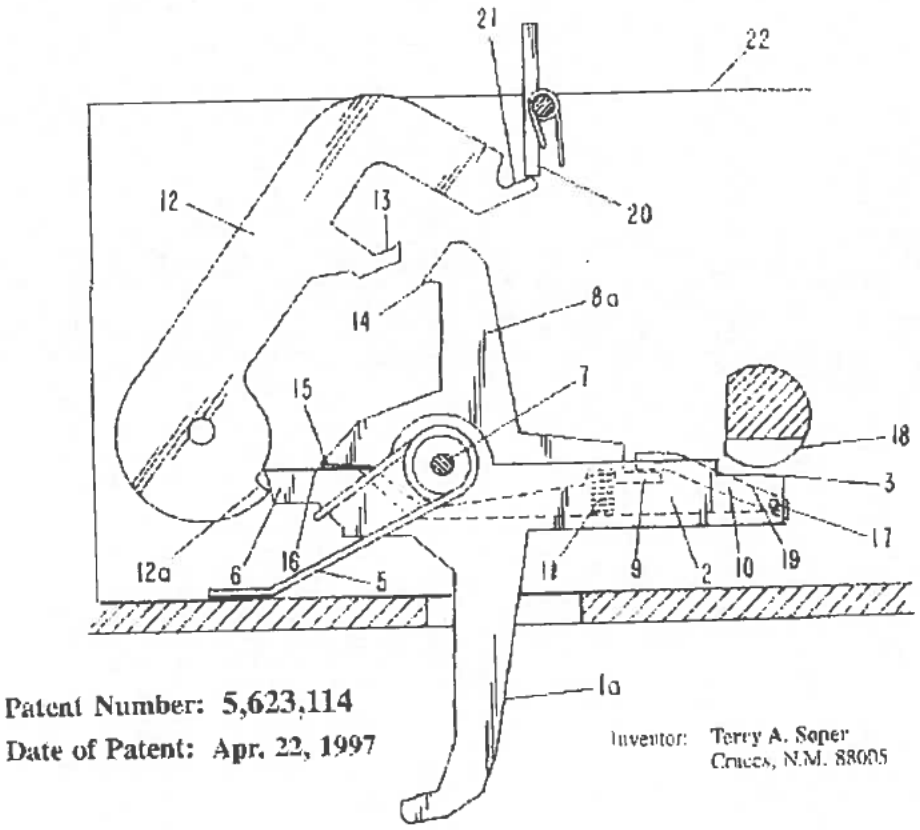
fire parts or even modifying them to fire from an open bolt or other configuration that may be developed in the future. Also enabled is the creation of upper receiver assemblies in other calibers or with different barrel lengths that can be quickly mounted on the lower receiver; as noted earlier, these give the owner of such a rifle a number of automatic weapons for the price of one.

In the interest of history, and to allow government organizations to see what is still available for them in the way of selective-fire weapons, this chapter examines the various parts, modifications, and conversions that have been created and are possible with an AR-15. It should be noted, however, that converting a semiauto-only rifle to a selective-fire weapon without prior approval by the BATF is illegal and is permitted only when the work is done for government agencies. Anyone else who does such conversions faces heavy fines and/or imprisonment and confiscation of his firearm. Given the availability of selective-fire AR-15s already available and the quasi-selective fire gadgets like the Hell-Fire (described in the previous chapter), an illegal conversion is not worth the humiliation or the price that will be paid in terms of both money and freedom.

CONVERSIONS

That said there are a number of ways to convert an AR-15 to auto fire. Some are much better than others. Most people assume that semiauto rifles are hard to convert to selective fire, but in fact this isn't so for most firearms—and the AR-15 is no exception. In fact, Browning made his first machine gun with a lever-action rifle coupled with a flap arrangement at the barrel, thereby demonstrating that not even a semiauto action is necessary to create a selective-fire weapon. (In fact, such "conversions" happen by chance; most gunsmiths admit that people often bring guns in for repair that have become automatic weapons due to stuck firing pins, broken parts, and so on. These weapons are seldom turned over to the BATF but, rather, repaired and given back to their owners.)

The catch to this is that not all selective-fire conversions are good and some of the accidental ones created by part failure as well as those made illegally can be extremely dangerous. That said, it is good to examine some of the poor ones first to see what should never be done in the way of modifications. And again, a warning:



Patent drawing for a selective-fire mechanism unlike the one that has become more or less standard with automatic versions of the AR-15.

It is against the law to alter a semiauto weapon to fire in a full-auto mode without the appropriate approval from federal, state, and local authorities. Severe penalties are prescribed for violations of these laws

One way to convert an AR-15 to auto fire is to place an automatic rifle disconnector, safety selector, hammer, and trigger into a commercial semiauto AR-15 or to remove the selector and grind off the catch in the face of the hammer. This will enable some slam-fires when the selector is placed in the auto mode with the auto parts or, in the case of removing the sear, whenever the trigger is pulled. As mentioned elsewhere in this book, this is nearly suicidal because, sooner or later, one of the primers will fail to fully ignite and a bullet will be lodged in the barrel. At this point another bullet might follow the first one, or the shooter might assume that the problem is mechanical rather than with the ammunition and then chamber and fire another round. This will blow up the barrel and quite possibly injure the shooter and/or those around him.

Pistol primers might improve this situation somewhat, giving a greater chance for full ignition, but they might also fire a round every time a round is chambered since the floating firing pin of the AR-15 is too rough for pistol primers. In this case, the gun might start firing when a round is simply chambered and continue to do so until the magazine is emptied. Certainly, a weapon that starts firing in full automatic on its own when a round is chambered is far from ideal for anyone but the criminally insane.

Another full-auto conversion that overrides the semiauto control can be created by locking the hammer back and putting the selector in the safe position. Once this is done, the receiver halves are opened and the striker (a rod that moves freely in the bolt carrier so that it can strike the rear of the firing pin) goes inside the bolt carrier; the striker is held in place because it's large enough to be retained by the curve of the bolt carrier.Once this is done, the user then closes the receiver halves, pulls back the carrier and locks it in place with the bolt hold-open latch, and then places a full magazine—of however many rounds he wishes to fire—into the rifle.

At this point, hitting the hold-open release so that the bolt goes forward will fire the cartridge that's chambered when the striker hits the firing pin. This most likely will cause the rifle to cycle, strip off another round from the magazine, and fire it when the striker hits the firing pin. This probably will continue until something breaks or jams or the magazine is emptied. In theory this action can be stopped by pushing the bolt hold-open latch down to catch the bolt—but by the time the shooter accomplishes this, the gun is probably empty. Again, a system only Charles Manson would like.

This last system is about as bad as removing the disconnector and—like the other—not recommended. However, we'll see later that the striker itself can be used to create an automatic version of the AR-15 that fires from an open bolt.

The Automatic Disconnector

Perhaps the strangest "machine gun" ever created was the Automatic Disconnector marketed by S.W.D. in 1985. This device consists of two sheet-metal parts that were capable of transforming a standard Colt Sporter from semiauto to auto-only fire. The BATF ruled that the parts themselves were the machine gun (a ruling that may seem odd to most people but that had a precedent dating back to 1968 when the Gun Control Act passed by Congress classified parts made only for machine guns as machine guns). So the Automatic Disconnector parts became, as gun writer Nolan Wilson put it, "a submachine gun to fit every wallet"—because it fit *into* a wallet.

The system was ingeniously simple. The connector link (stamped from 0.050-inch-thick steel) fit around an AR-15 disconnector and extended back in the receiver to sit under the rear takedown pin. The pivot plate (stamped from 0.30-inch-thick steel) extended into a notch in the rear of the connector link and extended upward behind the rear takedown pin.

When a Sporter was fired with these two additional parts in it, the disconnector operated in the usual manner, holding the hammer back when the trigger remained pulled. But when the bolt carrier slammed the bolt into place, chambering a round and locking the bolt, the rear of the carrier also hit the pivot plate. This in turn levered around the rear push pin, pulling back on the connector link, which jerked back the disconnector, releasing the hammer, which continued forward, striking the firing pin and firing the cartridge. (This gadget is why the newer Colt Sporters have a bolt carrier with its lower rear surface completely milled out.)

The drawbacks to the Automatic Disconnector are that it fires only in auto mode and requires quite a bit of energy to force the pivot plate forward. It's probable that a dirty rifle would have problems with the bolt's failing to lock. Nevertheless, it is a display of the inventiveness that made the country great and now, more often than not, is stymied by bureaucrats and lawmakers.

Motorized Firepower

Although a motor-driven rifle is not suitable for combat, such a device might have some very limited use on a vehicle or airplane, or with remote-controlled "robots." In theory, it is possible to connect an assembly similar to the B.M.F. Activator (covered in the previous

chapter) to a motor. Adjusting the motor speed would control the rate of fire.

Also, a solenoid might be connected to the trigger to create similar effects. Using various electronic counters and timers could make it possible to fire bursts of various counts and speeds.

Of course, such modifications are considered illegal unless done under the cover of government work.

Finding the Right Parts

The most practical conversion of an AR-15 to auto-fire is simply employ the auto-fire parts designed by Colt (or, better yet, by buying one of the company's automatic rifles). For older guns, the semiauto can be transformed by drilling a hole for the auto sear in the proper place; newer ones require milling out metal sections of the receiver because the parts and receiver have purposely been designed not to match so as to discourage unauthorized conversions. Placement of the auto-sear hole is critical, requiring very careful measurement, and, if possible, a drilling jig created from a previously converted gun should be used. (This is not a job for an amateur and to be legal must be done on a weapon preapproved for government or law enforcement work.)

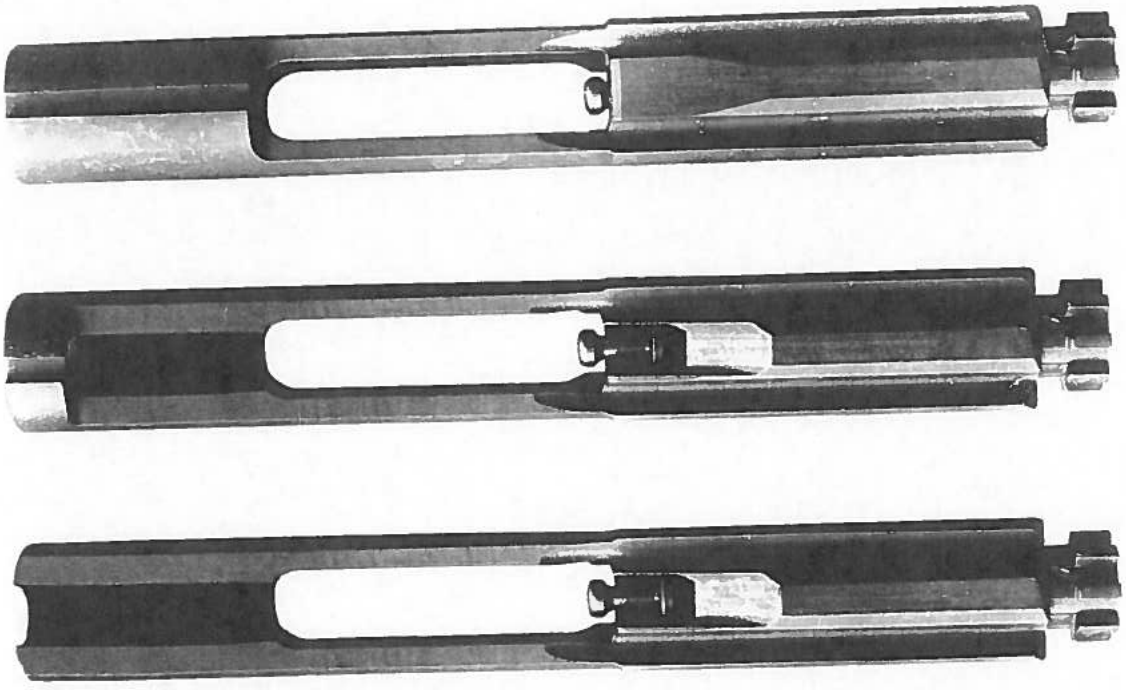
As for the auto sear and other parts, they can generally be purchased from dealers like Quality (Bushmaster), Jonathan Arthur Ciener, or others, *only* if the proper paper work is supplied by the purchaser to prove that he has a legitimate need for the parts. Among the necessary parts, assuming that a semiauto-only gun is being converted, are an M16A1-style bolt carrier, trigger, hammer, sear, selector, and disconnector.

It is possible to convert a rifle to three-round burst fire once the auto-sear hole is made and the piece fitted to the rifle. The burst-fire parts are also available from some sources, with TAPCO and SARCO currently offering them at the lowest prices. Currently users have the choice of two three-position selector kits (safe-semi-auto or safe-semi-burst) or a four-position kit (safe-semi-burst-auto).

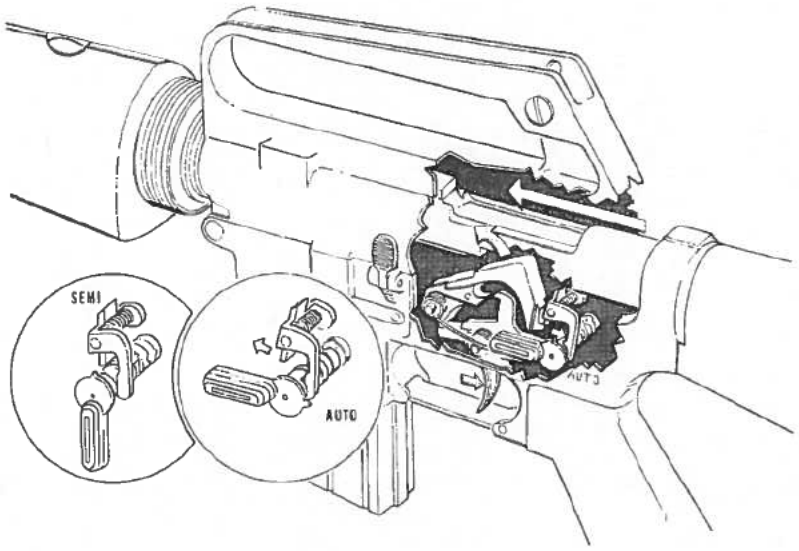
Rather than replacing the semiauto bolt carrier, it is possible to get a metal insert for the rear of the carrier. It generally works well but has a tendency to come loose over time. For better results the conversion plate should be welded in place or—better yet—an M16-style bolt carrier purchased.

The Drop-in Sear

Those who don't want a hole drilled into the receiver to accommodate an auto sear pin may convert it to selective fire by using the so-called drop-in auto sear and then replacing the semiauto parts listed above for



The different types of bolt carriers can be readily identified by viewing them from their lower side. Top is an M16 carrier, center is the first production-style AR-15 Sporter (semiauto only), and the bottom is the later-production Colt semiauto bolt carrier.



Original disconnector mechanism employed with the AR-15.

selective fire. But this is generally a lot of work and offers little in the way of advantages.

Like the Automatic Disconnector, the drop-in auto sear has itself—by bureaucratic magic—been classed as an automatic weapon. Consequently it is sometimes possible to buy one of these sears as a machine gun. This raises the sticky question of whether it can actually be *used* in what was originally a semiauto-only rifle. At the time of this writing the answer appears to be no. So one should be careful about purchasing even a drop-in sear made before the automatic weapons manufacturing ban because the sear might be used to illegally convert a sporter into a selective-fire rifle.

The drop-in sear works just like the standard auto sear except that it has its own body that contains the trip lever/sear and its spring and pin. The sear assembly is pretty easy to make, though careful measurements must be taken because the dimensions of many rifles, especially those not originally designed for automatic fire, can vary considerably.

The body of the drop-in sear housing can be aluminum. The sear and its cross pin must be steel, and the sear should be heat-treated to minimize wear. The spring size is not critical, but it must be strong enough to quickly position the sear to trap the hammer within the cycling rate of the bolt. The best results are generally gotten from a spring in the neighborhood of number 18 music wire about .500 inch long with an outward diameter of .125 inch; 10 turns of the wire should give the spring the tension needed. The pivot pin can be either solid pin or a roll pin and should not easily drift out of place while still allowing the sear to move freely. Usually a pin .470 inch long and .093 inch in diameter works well.

The drop-in sear's housing must fit tightly into the space behind the safety selector; extra metal should be left on the finished sear body so that it can then be tightly hand-fitted into its space. The sear should then be tested by cycling an empty firearm by hand a number of times *before* trying to actually fire it with live ammunition.

Open-Bolt Firing

Another possible auto conversion allows the rifle to be fired from an open bolt. The main consideration with this system is fashioning a striker that's heavy enough to give consistent ignition of the primer even when the firearm gets dirty, yet make it light enough to avoid undue wear or even breakage of parts. Care must also be taken to keep the cyclic rate low, or the weapon will become uncontrollable. This can generally be done with both the selection of ammunition and by adding weight to the buffer assembly and, perhaps, to the bolt carrier. Again, experimentation is called for to create the correct combination.

The drawbacks to open-bolt firing are the somewhat reduced accuracy (the bolt travels forward and locks shut as it fires, jarring the aiming point considerably on all but the most securely held rifles) and the decreased safety of the rifle. Probably the greatest concern should be safety.

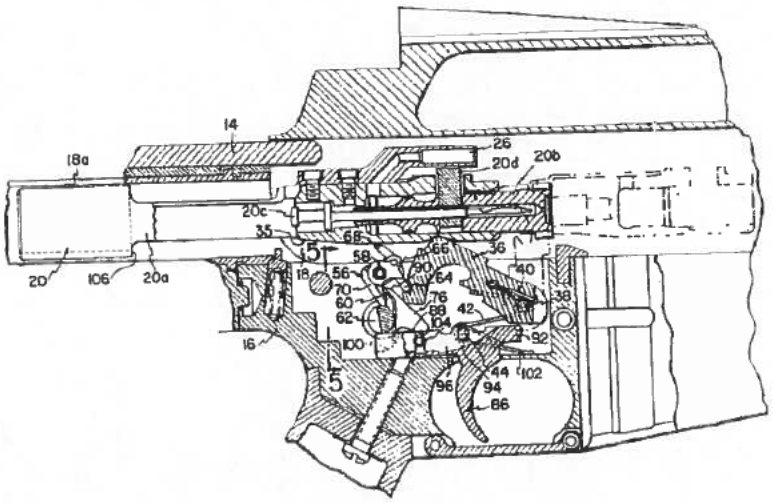
A problem arises from the fact that the rifle will fire when a loaded magazine is in the well and the bolt slams forward. This means that if the bolt is held by the hold-open lever, for example, releasing the bolt on a poorly designed system can cause the rifle to fire. Likewise, dropping a rifle with a closed bolt and a full magazine in place might cause the bolt to cycle back and then slam forward, firing a round. The same would take place if a weapon with the bolt locked back and the safety on was dropped: the fall might jar the sear loose and cause the rifle to fire.

The best solution to these problems is to put a second sear notch on the lower side of the bolt carrier, locating the notch so that it prevents the bolt from traveling forward if the trigger isn't pulling the sear down. The notch should be located so that the sear

catches the bolt carrier before it retracts far enough to strip a cartridge from a magazine on a return trip.

This, and proper safety measures, should prevent any accidental discharge. Of course, it's essential that anyone performing this conversion fully tests the components to ensure that they actually do prevent accidental discharges and that parts will not fail and thus produce injuries or worse.

Even though selective-fire rifles are relatively safe, the bottom line is that they are not as safe as most commercial semiauto rifles. Users should beware of any lack of redundant safety devices and be very, very careful when using such firearms. In short, the open-bolt modification can produce a weapon considerably less safe than the regular AR-15. It is possible to create an open-bolt firing system by modifying the hammer to act as a sear, but this creates a very heavy trigger pull. It's better to drill the extra holes in the lower receiver to accommodate the sear or construct a subassembly similar to the auto sear discussed above into which the open-bolt sear can be placed.



OPEN BOLT FIRING MECHANISM FOR AUTOMATIC FIREARM

Inventor: Henry J. Tatro, Westfield, Mass.

Assignee: Colt Industries Operating Corp., West Hartford, Conn.

4,433,610

Feb. 28, 1984

Open-bolt firing mechanism for the AR-15 (patent number US-04433610).

A trigger group system can be created to do this by slightly modifying the M231 open-bolt system. Other conversion arrangements are possible, but this is one of the easier ones. The new sear and trigger extension (which sits in the disconnector slot) should both be made of steel, as should the sear cross pins. The piano wire used to construct the sear spring should be similar to that used for the standard hammer spring (some experimentation will be called for). Two new pins and holes are necessary to hold the auto sear in place. The forward pin goes between the C-shaped opening at the front of the sear to limit its travel; the rear pin acts as pivot point for the sear and retains its spring as well.

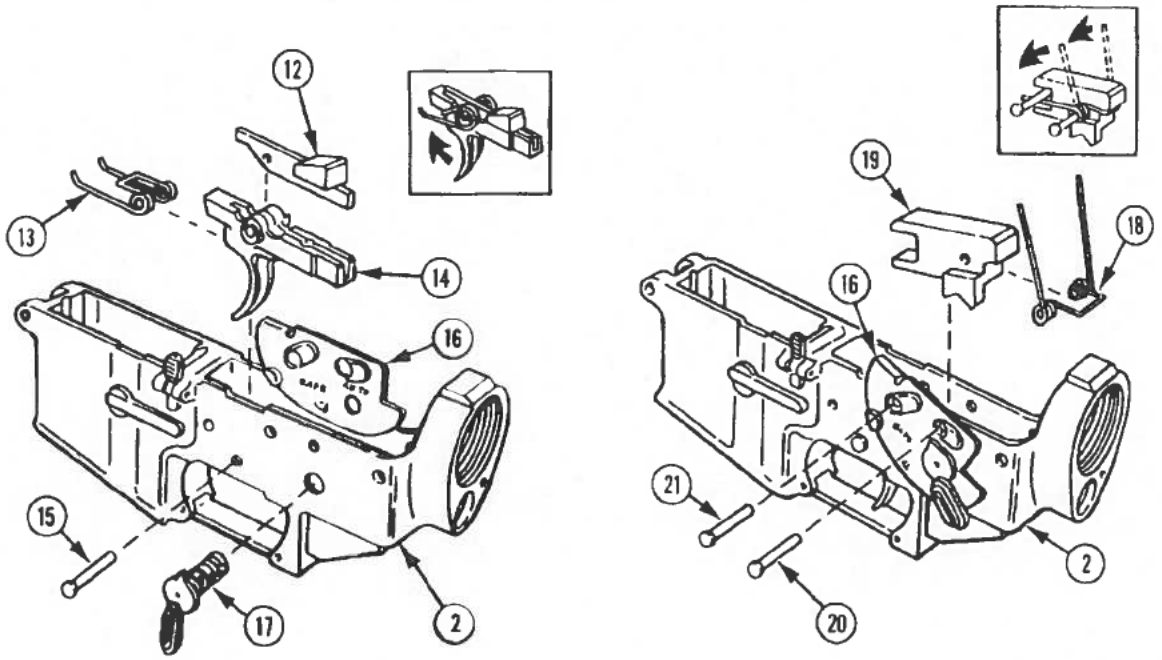
The striker should be made of steel, and it needs to be to be sized according to the considerations listed above. In general, this is in the neighborhood of .575 inch in diameter and 3 inches or less in length. The striker must fit inside the rear half of the bolt carrier, where it should move freely inside the carrier. It is essential that the striker hit the firing pin with enough force to fully fire the cartridge's primer—a misfire could leave a bullet in the barrel, which can be disastrous during full-auto fire.

A number of other auto conversions of the AR-15 are undoubtedly possible, and it seems likely that inventors will continue to come up with new systems. But the most important consideration will always be the quality of the work: failure of parts can lead to dangerous operation, even damaging the weapon, and cause grave injury to the shooter or those around him. Converting a firearm to automatic fire is not a job for the novice.

The TAC Trigger Mechanism

The TAC trigger system makes it possible to select auto or semiauto fire through the amount of pressure applied to the trigger of a selective-fire AR-15. This system releases the semiauto's sear with a 5-pound trigger pull; when the pull is increased to 8 pounds, the system automatically goes into its selective-fire mode. This system does away with the need to fool with the selector and seems ideal for close-quarter combat when a "panic pull" would give a full-auto response to a threat.

The trigger assembly fits and functions in AR-15s with standard "M16" and three-round-burst selective-fire modifications. And, it is not considered to be a machine gun in itself since it can't be employed to convert a



The M231 trigger group design lends itself to use in open-bolt auto fire systems.

semiautomatic into a full-automatic without the addition of other automatic parts. The TAC mechanism works with a drop-in auto sear, though a lot depends on the quality of the drop-in sear itself.

The TAC mechanism works in .223 and 9mm guns as well as most .22 conversion kits, thus giving it some added flexibility for owners of an automatic version of the AR-15.

Adjusting Ejected Cartridge Arc

For everyone who fires an automatic weapon, not only those who are left-handed, nothing is quite as irritating as an AR-15's throwing its cartridges straight back from the ejection port, showering especially the left-handed shooter with hot brass—and denting cartridges so they are harder to reload. Fortunately, there are a few tricks that can be employed to reduce or even eliminate this nuisance.

For lefties, the solution may simply be to get an upper receiver with the deflector "bump" in it. This will cause most brass ejected rearward to bounce away and thereby miss the shooter.

However there's a more elegant solution that also will save brass from getting dinged up when it leaves the ejection port. This is done by replacing a few key parts. That said, it is important to remember that the ejection angle varies greatly with the ammunition used. This is because the speed with which the carrier travels rearward also determines how violently cartridges are extracted and tossed from the gun. In general, the more powerful the ammunition, the greater the likelihood for the empties to be thrown forward, rather than rearward, when ejected from the port.

But just using hotter ammunition is not the best cure for the problem, for the simple reason that it adds wear and tear to the gun—and there are also upper limits to how "hot" ammunition can be before it presents a danger to gun and shooter. So the other solution should also be explored, perhaps first if a gun has gradually started throwing empties rearward.

This solution is pretty simple: replace the ejector and extractor springs with new ones, and also add the D-fender buffer around the extractor spring when performing this job (more on the D-fender buffer elsewhere in this book). Doing this usually shifts the ejection pattern forward so that it is no longer a problem.

Of course, once the springs are replaced, the shooter may discover that shells are being tossed too far forward and getting dented on the front of the ejection port, or even threatening to jam the rifle. In this case, removing the D-fender buffer or shortening the extractor spring by just a coil or two (removing just one link at a time) should cure this problem.